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AN ATTEMPT AT A STATISTICAL DETERMINATION OF THE BIRTH RATE IN THE UNITED STATES BY A. N. KIAER, EX-DIRECTOR OF THE STATISTICAL BUREAU OF NORWAY, HONORARY MEMBER OF THE AMERICAN STATISTICAL ASSOCIATION.

The following article was the author's last work and unfortunately he did not live to see it through the press. As the biographical sketch indicates, hardly any writer anywhere and probably no American is more familiar than Director Kiaer with the abundant statistical literature dealing with the fall of the birth rate in most civilized countries. The present study is of importance as an example of method in this field in a case where registration figures are inadequate or lacking.

Internal evidence seems to indicate that the writer did not have access in Norway to certain primary American sources and recent official publications, and that at some points, as was natural and almost inevitable, he misunderstood American practice. Had he lived, these defects would doubtless have been brought to his attention through correspondence and corrected by him. In view of his death, it has seemed well to publish so much of the study as has methodological value, and at the same time to point out in editorial notes how his material might have been supplemented or his interpretations modified. The article grew in part out of correspondence with an American friend, Walter F. Willcox, to whom the manuscript was sent and by whom it has been prepared for publication. Those changes which call attention to other material or involve a probable difference of judgment between author and editor have been signed in order that the source of each statement or query may be made clear.

In May, 1918, Dr. Kiaer wrote a long letter to Dr. Willcox about an international study of the falling birth rate upon which he was engaged, and asked advice on certain points regarding the birth rate in the United States and its changes. This letter at the close raised these questions.

1. May it be assumed that the infant mortality in the United States is about the same as in Massachusetts?
2. May it be assumed that the general mortality in the United States exceeded the mortality of the registration area in the same year by 4 or 5 per cent.?
3. Is it probable that the difference between the reported birth rate in Maine, Vermont, Massachusetts, Connecticut and Michigan taken together and the unknown birth rate in the whole United States decreased by a little more than one-half between 1898 and 1908 as the writer's figures indicated?
4. Is it probable that the number of alien emigrants from the United States in the period 1901–07 was about 32 per cent. of the number of alien immigrants in the same period?

These questions were received by Dr. Willcox in the summer of 1918, when the government work upon which he was engaged prevented his giving them the time and attention which their importance and the standing of the writer would have otherwise demanded. The following paragraphs from his reply of July 25, 1918, will aid the reader to follow Dr. Kiaer's argument in the article.

"With regard to your assumption that the infant mortality in the United States is probably not far from the same as that in Massachusetts, I am disposed to believe you have chosen the best obtainable basis, but that the infant mortality in Massachusetts is less, not greater, than that of the country as a whole.

"My reasons for this opinion are two. In the first place the public health movement in this country began earlier and has probably gone farther in Massachusetts than in any other part of the country. This is the universal opinion which has now found some support and basis in an excellent report of Dr. C. V. Chapin on the work of the various state boards of health in which, after devising a marking system, he concludes that Massachusetts is doing the best work in public health, with New York and Pennsylvania ranking nearly side by side in second place.*

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* Charles V. Chapin, Report on State Public Health Work based on a Survey of State Boards of Health made under the Direction of the Council on Health and Public Instruction of the American Medical Association, Chicago, 1916, pages 193 ff. Whether these three states still stand in the same relative position as when the survey was made may be doubtful.

"The other reason is that Massachusetts, notwithstanding the large number of foreign born, has a better educated population than the average and a very small proportion of Negroes among whom the infant mortality is very high.

"I reconcile this opinion with your conclusion that the infant mortality in the registration area is apparently less than that in Massachusetts,* by suggesting that infant deaths are less completely registered in other parts of the registration area, especially the states recently added to that group, than they are in Massachusetts. I am convinced that in most parts of the registration area, and especially in the rural districts, not a few deaths go unrecorded and that such omissions are more common among infants than among adults. Consequently, if I were to modify the infant mortality rates of Massachusetts for your purposes, I would increase rather than decrease them.

"Mr. Gannett's argument which you mention,† like that of Mr. King on the same subject in the *Political Science Quarterly* which you do not mention,‡ is unconvincing because neither takes account of the change in the form of the age question in 1890 and because both assume that the results of a census may be checked by the results of registration, whereas in my opinion, at least under American conditions, the census is the more accurate measure and registration figures should if necessary be adjusted to agree with those of the census.

"Your second question, whether the death rate in this country is probably about the same as that of the registration area increased by perhaps 4 or 5 per cent. is discussed in my paper

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* With this conclusion of Dr. Kiaer's should now be compared the results reached in the Census Bureau's first and second annual reports on birth statistics for the registration area for births, including in 1915 the New England States, New York, Pennsylvania, District of Columbia, Michigan and Minnesota, and, in 1916, the same states with Maryland. The yearly deaths of children under one year of age per 1,000 living births shown by these reports were:

	1915.	*1916.*
Registration area	100	101
Massachusetts	101	100

showing that the infant mortality in Massachusetts is a fair representative of that in the registration area for births, but in no wise invalidating Dr. Kiaer's conclusion that the infant mortality in Massachusetts was higher than the average in the registration area for deaths which included many more states than the registration area for births. W. F. W.

† Am. Stat. Assn. Publications, IV (1894): 99–102.

‡ Pol. Sce. Q. 12 (1897): 608–621.

on the death rate of the United States in 1900.* My reasons for thinking that there are, or were in recent years, significant omissions in the recorded deaths in New York State are set forth in various reports as consulting statistician to the New York State Department of Health, and in this respect I believe that New York is better off than most of the registration states.

"Regarding your third question, I believe that the difference between the birth rate of the United States and that of the five registration states did diminish to a significant degree between 1898 and 1908, but find it hard to accept the conclusion of your argument that the difference was reduced by more than one-half.

"The number of alien emigrants from the United States between 1900 and 1907 was probably more rather than less than one-third of the number of alien immigrants in the same period.

"On these four points, as you will see, I am in substantial agreement with your conclusions. The main question raised in my mind by your discussion is whether our American figures in these various fields are accurate enough to justify as refined an analysis as you have given them. I have hesitated to make a study of the birth rate in the United States or even in any of the states, because I have much doubt of the trustworthiness of the registration figures over a series of years. Still I hope very much that you will be able to prepare an article on this subject for the American Statistical Association."

After these preliminary explanations the substance of Dr. Kiaer's article follows:

How should the birth rate of the United States be estimated?

The American Census of 1900 gives the following information about the statistics of births: "In the census reports of 1880 and 1890 the number of births in the census years was estimated by adding to the number of living children returned as under one year of age on June 1 of each census year, the number who were born during the year but died before the date of the enumeration. . . . Unfortunately both factors are erroneous to a certain indeterminate extent. . . . The method of estimating the number of births in the census year, by addition of the population under one year of age and the 'born and died' has been followed in part . . . at the present census."*

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* Am. Stat. Assn. Publications X (1906): 137.

As this subject touches a fundamental point in the whole matter it is necessary to examine it at some length. It is obvious that if each of these two figures is correct their sum would give the number of births in the year before the census. In this way the births in Massachusetts were estimated.†

Children under one year of age enumerated June 1, 1900	60,492
Born and died in preceding year	6,736
Total births in census year	67,228

With this figure showing the estimated number of births in Massachusetts June 1, 1899, to May 31, 1900, we may compare the results of registration by averaging the births reported in 1899 and 1900, or by adding seven-twelfths of the births of 1899 to five-twelfths of the births in 1900. The former method shows 71,678 births in the census year, the latter 71,922, and the larger figure seems the better.‡

The best way to find the birth rate of a registration state with good records of births is to divide the number of births registered by the enumerated population. As far as I know this can be done with accuracy only for Massachusetts.§

The number of births in that state within the five-year period preceding June 1, 1900, was 359,581.‖ The next step is to compute how many deaths would have occurred among these births. March gives for each calendar year the deaths in Massachusetts at each year of age under five,* and from these figures we can estimate the number of deaths before June 1, 1900, among children born in Massachusetts between June 1, 1895, and May 31, 1900, inclusive, by using the following ratios derived from Norwegian, Swedish and German statistics.

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* Twelfth Census (1900), Vol. III, p. xlix. The Census of 1910 did not give any attention to the statistics of birth.

† *Ibid.*, p. 356.

‡ The facts that Dr. Kiaer at this point quotes March's Stat. Intern. as his authority and that he does not anywhere in the article mention the Massachusetts registration reports in which births are shown by months, suggest that he may not have had access to that series. The number of births registered in the census year was 71,650 or 28 more than Kiaer estimates by one method, and 216 less than he estimates by the other. The estimate of the census thus falls short of the number registered by 4,422 or 6.2 per cent. W. F. W.

§ With this opinion I cannot agree. The best test of the completeness and accuracy of birth registration in American states results, perhaps, from an effort to find a birth report for every infant whose death is reported. Recently the Bureau of the Census applied this test to the records of the New England States in 1916. In order of birth certificates not found, the states ranked as follows: New Hampshire, 5.6 per cent.; Vermont, 5.7; Massachusetts, 8.7; Maine, 9.5; Connecticut, 15.2; Rhode Island, 18.3. W. F. W.

‖ March, Stat. Intern., p. 44.

	Per Cent. of Children Dying Who Were Born in	
Year of Age at Death.	*Later Calendar Year.*	*Earlier Calendar Year.*
Under 1	70	30
1	60	40
2	55	45
3	50	50
4	50	50

As these three countries showed no marked differences it seems safe to apply the foregoing ratios to Massachusetts and assume for example that of children under one year of age dying between June 1, 1895, and May 31, 1896, about 70 per cent. had been born in the same period. On these assumptions 63,559 deaths would have occurred before the census in the quota of 359,581 births and 296,022 would survive. But the census found only 282,237.

As some of these were foreign born and others were natives of the United States, but not of Massachusetts, the next step is to estimate the balance of immigration and emigration among children under five years of age. Those in the state in 1900, who had been born abroad, numbered 6,846.† The number in Massachusetts born in other American states and the numbers in foreign countries or in other American states born in Massachusetts are unknown and must be estimated. We turn first to figures for the entire country. In 1900 there were in the United States 52,487 foreign born white children under five years of age, and 53,271 such foreign born children of all races. During the years 1908–10 the emigrants of all ages were 32 per cent. as numerous as the immigrants, and Mr. Willcox is of the opinion that between 1900 and 1907 the proportion was still larger.* But this proportion applies to persons of all ages, and for children under five years of age it may be very different. To estimate what it was, Swedish figures may be used. During the decade 1901–10 there were 13,195 children under five who left Sweden for non-European countries, and 7,000 such children entered Sweden, showing that the immigration of children largely from the United States was about 53 per cent. of their emigration, largely to the United States. But during the three years 1908–10 there were 431,050 alien immigrants to the United States under fourteen years of age (the number under five is not reported), and 38,046 such alien emigrants, or about 12 per cent. of the immigration, and for later years the ratio was similar. It seems probable that children born in the United States of alien parents and leaving the country with their parents were not counted as aliens and that this difference of practice explains the divergence between the Swedish and the American ratios. If that be so, the Swedish ratio is the one applicable to the present problem, and we may assume that American born children under five years of age leaving the United States are about one-half as numerous as such foreign born children arriving in the United States.† For the same reason we may assume that the number of children born in Massachusetts and migrating to some foreign country is about one-half of the children born abroad and migrating to Massachusetts.

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* *Idem.*, p. 819.

† Twelfth Census, Vol. II, p. 50.

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* Compare Am. Econ. Review. Supplement to Vol. 11, No. 1 (1912), pp. 66 ff.

† Dr. Kiaer's method is sound, but I suspect that he has misunderstood American figures and, in consequence, misinterpreted American conditions. Probably persons born in the United States and living in Canada are far more numerous than those living in any other foreign country. There were, 1,179,807 Canadians by birth in the United States in 1900, and 127,899 natives of the United States in Canada in 1901. From these figures it seems safe to infer that the number of American born children living in Canada was not far from 11 per cent. of the number of Canadian born children living in the United States. Even more significant are the figures for certain European countries. Thus in 1900 there were 840,513 persons living in the United States who had been born in England or Wales, and in 1901 there were 16,668 persons living in England and Wales who had been born in the United States. It seems safe to infer that the number of American born children living in England and Wales was not more than 2 per cent. of the number of English born children living in the United States. Following the same line of argument it seems probable that the number of American born children under five years of age living in the main countries of Continental Europe, France, Italy and Germany, in 1900, was not far from 2 per cent. of the number of children born in the foreign country and living in the United States. From a study of foreign censuses I inferred in 1899 that not far from 170,000 persons who had been born in the United States were living, in 1890, in foreign countries (The Decennial Census, p. 20). By 1900 that number had risen to perhaps 210,000 as a result mainly of an increase in American migration to Canada. If these figures are even approximately correct the emigration of natives of the United States during the years before 1910 was about 2 per cent. of the immigration of persons born abroad. W. F. W.

The next step is to estimate the interstate migration of children under five years of age. As the foreign born white children under five years of age in Massachusetts in 1900 were 0.81 per cent. of all the foreign born white in the state, it may be assumed that, of all the natives of other states living in Massachusetts and of all natives of Massachusetts living in other states, 0.81 per cent. also were under five years of age.* Arguing from these assumptions it appears that the number of children under five years of age in Massachusetts on June 1, 1900, as estimated from the sum of births and immigrants diminished by the sum of deaths and emigrants, should have been 296,022 which is 16,385, or 5.8 per cent., more than those found by the census. It seems best to accept the larger total.

The annual average number of births in Massachusetts between June 1, 1895, and May 31, 1900, was 71,916, and the estimated population at the middle of the period after making various adjustments was 2,722,825, from which the birth rate is computed at 26.41 per 1,000. The birth rate for the period from June 1, 1905, to May 31, 1910, computed in the same manner, was 25.14. For 1910 it appeared that the number of children enumerated should be increased by 9.02 per cent.

The method employed in these computations is applicable only to states in which registration is substantially complete. In other states, however, approximate results may be reached through inferences or assumptions based on the Massachusetts statistics or on those of other countries.

In this discussion, infant mortality figures are of primary importance because the number of deaths among the children born within a fixed period before the census day is the essential link between the registered number of births and the enumerated number of children living. The next step, therefore, is to estimate the mortality of children under five years of age in the United States. If the infant mortality figures of Massachusetts be taken as the starting point, allowance must be made for two differences between these population groups, the higher proportion of urban population in Massachusetts, and the lower proportion of colored. They are shown in the following comparison.

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* Here again the method is sound, but better figures than those to which Dr. Kiaer applied it are obtainable. From the Massachusetts census of 1885 (Vol. I, pp. 572 ff.) it appears that of the 297,834 natives of other American states then residing in Massachusetts 7,307, or 2.5 per cent., were under five years of age. For estimating the number of children born in other states and residing in Massachusetts at other dates, this proportion seems the best obtainable. For estimating the number of children among the natives of Massachusetts residing in other states the most that can be claimed for this ratio of 2.5 per cent. is that it is probably nearer the truth than the one adopted in the text. The figures at least suggest that the proportion of children among interstate migrants is several times as great as that among international migrants. W. F. W.

	Per Cent.		*Per Cent.*	
	White.	*Colored.*	*Urban.*	*Rural.*
1900.				
United States	87.9	12.1	40.5	59.5
Massachusetts	98.7	1.3	91.5	8.5
1910.				
United States	88.9	11.1	46.3	53.7
Massachusetts	98.8	1.2	92.8	7.2

What is the death rate of white children in American cities? The urban death rate of white children under one year of age per 1,000 living population of that age was

	Death Rate of White Infants in Cities.	
	1900.	*1910.*
In Massachusetts	190.6	166.6
New York	178.3	148.8
Pennsylvania	.....	158.7
Original registration states	180.0	156.6
Registration area	171.1	.....

In view of the evidence that public health work in Massachusetts is more efficient than in most other parts of the United States, the foregoing figures showing a higher mortality in Massachusetts at both dates suggest that, outside of Massachusetts at least, there were probably significant omissions in the recorded deaths of infant children.

A similar examination of the urban death rate of white children one to four years of age, inclusive, yields different results.

	Death of White Children One to Four Years of Age in Cities. 1900.	*Death of White Children One to Four Years of Age in Cities.* 1910.
In Massachusetts	22.5	16.1
New York	27.8	19.1
Pennsylvania	....	19.6
Original registration states	24.9	17.5
Registration area	23.6	....

For this age period Massachusetts had at each date the lowest death rates, and the rates in the cities of the original registration states exceeded those in Massachusetts by about 10 per cent. In view of the uncertainty about the death rates of children under one year of age, and the much greater accuracy of the death rates at ages one to four, it seems admissible to assume that the death rates of white children under one year of age in the cities of Continental United States, as a class, exceeded the rate in Massachusetts cities by about 10 per cent. On that hypothesis the rates would be 190.6+19.1 or about 210 in 1900, and 166.7+16.7 or about 183 in 1910. For white children one to four years of age it seems best to extend the average rate in cities of the registration states to all American cities.

What is the death rate of colored children in American cities?

In attacking this problem we cannot start with Massachusetts because the number of colored in its population is very small and the health conditions among colored in the state are not representative. Perhaps the best starting point is the death rate of colored children in cities of the original registration states. These should be increased 10 per cent. as the rates for white children were to allow for the probable excess in the rates outside of the registration states. On this hypothesis the death rates of colored children in cities were

	Under One Year.	*One to Four Years.*
1900	397.+39.7=437	55.7+5.6=61.3
1910	325.8+32.6=358	39.6+4.0=43.6

What is the infant mortality in the rural districts of the United States?

In his article on the "Death Rate in the United States in 1900," Mr. Willcox expressed the opinion that there was, in the United States, "no large and representative body of rural population wherein deaths are reported with sufficient completeness and accuracy to make the resultant death rates significant." Notwithstanding this difficulty, which is less serious now than in 1900, some estimate of that mortality is necessary to further progress with the present problem. The figures for white and colored must be kept separate. The next question then is, what is the white infant mortality in the rural districts of the United States? The best starting point, probably, is the white infant mortality of cities in the effort to estimate the probable relation between rural and urban infant mortality. Taking the infant mortality in cities at 100 per cent. the infant mortality of the rural districts in certain European countries was as follows:

Ratio of Rural to Urban Infant Mortality Per 1,000 Population at Age Specified.

(Latter = 100 per cent.)

Country.	*Under One Year.*	*One to Four Years.*	*Under Five Years.*
Norway	61.7	56.2	58.2
Sweden	74.3	70.8	68.3
Denmark	67.1	59.0	61.0
England and Wales	....	....	66.6
Average	67.1	62.0	63.5

If deaths in rural districts went unrecorded more commonly than in cities this fact would reduce percentages like the foregoing. This may be true to some degree even in Massachusetts, and is probably true to an important degree in the other registration states. The following ratios show that the difference between urban and rural infant mortality is greater in the United States than in Europe.

The fact that the ratio of rural to urban infant mortality among whites in 1900 was less in the United States than in Europe is probably connected with the fact that defects of registration in American rural districts were more common than in Europe and that, if any similar difference existed between American and European urban districts, it was smaller in amount. That the difference between urban and rural infant mortality in the United States diminished between 1900 and 1910 may plausibly be ascribed to improvements in the completeness of registration during the decade.

Ratio of Rural to Urban Infant Mortality per 1,000 Population at Age Specified.
(Latter = 100 per cent.)

	Whites.					
	1900.	*1910.*	*1900.*	*1910.*	*1900.*	*1910.*
	Under One Year.		*One to Four Years.*		*Under Five Years.*	
Original registration states	64.4	74.0	51.4	58.6	59.0	66.8
Massachusetts	67.4	79.4	61.3	70.2	63.3	72.9
New York	57.2	76.1	40.6	51.8	49.4	65.0
Pennsylvania	....	86.2	....	76.0	....	81.9
	Colored.					
Original registration states	55.1	54.8	44.7	53.8	50.9	54.3
Massachusetts	58.0	32.8	35.0	20.0	50.5	30.5
New York	44.1	47.7	28.1	38.2	36.1	41.0
Pennsylvania	....	69.0	....	59.8	....	62.3

The best assumption for 1900 apparently is that the death rate of white children under one year of age in the rural districts of the United States was to the same rate in the urban districts of the United States as the rate in the rural districts of Massachusetts was to the rate in the urban districts of Massachusetts, namely 67.4 per cent., a ratio very close to the average in the three Scandinavian countries, 67.1 per cent. But for 1910 the Massachusetts ratio of 79.4 per cent. seems too high to be probable. If it were correct the infant mortality in rural districts would have increased between 1900 and 1910 and that seems unlikely. The most plausible hypothesis apparently is that the white infant mortality in rural districts decreased 1900–10 at about the same rate as the white mortality at ages one to four and the urban white infant mortality. In Massachusetts the urban white infant mortality decreased 1900–10 by 12.6 per cent. and the rural mortality of white children one to four decreased by 18.2 per cent. Probably the rural white infant mortality decreased at something like the average of these rates, namely 15.4 per cent. The death rate of white infants in the cities of the registration area decreased 1900–10 by 8.5 per cent. and that of white children one to four years old in the rural districts of the registration area by 19.6 per cent. So the death rate of white infants in the rural districts of the registration area may be supposed to have fallen in the same decade by about 14 per cent.

We turn now to the question, What is the mortality of colored infants in the rural districts of the United States? Here the Massachusetts figures afford no satisfactory basis and it is best to start with those for the registration states. Probably these suffer from serious omissions and are consequently too low. On the whole, the fairest assumption seems to be that rural infant mortality bears to urban infant mortality the same numerical ratio among colored that it does among white.

By calculations such as these the probable death rates of children under one, one to four, and under five years of age in 1900 and 1910, both for urban and for rural districts and for white and colored in each, have been estimated.

The next step is to distribute the population of the United States at 1900 and 1910 between white and colored urban and rural and children and adult, in order that the infant mortality figures adopted as a result of the previous discussion may be applied to them. To understand the method as distinguished from the results of the paper, it is unnecessary to follow the details of the argument by which these estimates are made. They lead up to a classification of the population of the United States under five years of age on June 1, 1900, and July 1, 1910 into two age periods under one and one to four, each age group into white and colored, and each race group into urban and rural, or eight groups for each date. For each of these sixteen groups a death rate had previously been determined and by multiplying the population by the rate the probable number of deaths is computed. The net result of the calculation is to yield estimated infant death rates for the population, urban and rural, white and colored, as follows:

Computed Death Rates.

Age	*Massachusetts.* *1900.*	*Massachusetts.* *1910.*	*United States.* *1900.*	*United States.* *1910.*
Under 1	177.8	160.1	179.9	161.5
1 to 4	20.8	15.3	21.9	16.8
Under 5	54.4	46.4	54.9	46.9

These figures indicate that the infant mortality figures in the United States were higher than those in Massachusetts at both dates and give some measure of the excess. The question whether the differences in these two census years were typical of those in the four earlier years for which the rates are needed is then examined with the result that it seems reasonable to assume that the mortality of children under one in the United States was in 1896–1900 about 2 per cent. higher and in 1906–10 about 1 per cent. higher than in Massachusetts, and that the mortality of children one to four years of age at both dates was about 10 per cent. higher than in Massachusetts.

With the aid of the results thus far reached it is possible to estimate the number of births in each year of the two five-year periods before the censuses of 1900 and 1910 necessary to yield the number of surviving children under five years of age called for by the census results as revised to allow for probable omissions. Then, by estimating the population in the middle of each of these ten years, the other terms of the ratio are secured and it becomes possible to compute birth rates. These computations lead to the following results:

Year.	*Estimated Population in Thousands.*	*Computed Births in Thousands.*	*Birth Rate per 1000.*	*Smoothed Birth Rate.*
1895–96	72,082	2,510	348	348
1896–97	73,383	2,443	333	333
1897–98	74,669	2,403	322	318
1898–99	75,998	2,273	299	304
1899–1900	77,389	2,277	292	292
1905–06	86,848	2,836	326	326
1906–07	88,718	2,851	321	313
1907–08	90,540	2,821	312	302
1908–09	92,090	2,521	274	292
1909–10	93,827	2,652	283	283

It will be noticed that in each five-year period much the sharpest fall in the birth rate was in the third of the four intervals. This is possibly if not probably due to errors in the census returns of children between one and two years of age, to which attention has been called in various countries. If the age returns are smoothed the resultant rates appear in the last column of the table.

Another point calling for explanation is the indicated increase in the birth rate between 1900 and 1906. This may plausibly be ascribed to the heavy immigration between those dates and its effect on the birth rate in the years immediately following. It is noteworthy that the average birth rate in the five registration states, Maine, Vermont, Massachusetts, Connecticut and Michigan, rose from 21.54 for 1901–05 to 23.84 for 1906–10, and that the most marked increase was for the year 1906.

A similar line of analysis has been carried back to include every census since the Civil War, computing the average birth rates for the three-year period and the five-year period preceding each census and averaging the results. The conclusions appear in the following summary:

Date of Census.	*Birth Rate for Preceding Period.*		*Average Rate.*	*Decennial Decrease.*
	Three Years.	*Five Years.*		
1870	380	400	390	
1880	361	389	375	15
1890	304	337	320	55
1900	306	319	312	8
1910	289	303	296	16

The excessive decline 1880–90 evidently needs explanation. That and the slight decline 1890–1900 are probably due to the change in the form of the age question in 1890 and the return in 1900 to the earlier form. If the rate in 1890 be raised from 320 to 342 to allow for this source of error and get a smooth series the birth rate in the United States underwent the following decreases figured as per cents of the initial average rate

	Per Cent. Decrease.
1868–78	4
1878–88	9
1889–98	9
1898–1908	5

indicating that the decrease during the last twenty years of the nineteenth century was much greater than during the first decade of the twentieth. In that respect the United States differs widely from most European countries where the decrease of the birth rate has been going on with accelerating speed as the following figures show.

	Average Annual Fall in Birth Rate in Per Cent. for	
Country.	*1870–1900.*	*1900–1912.*
England and Wales	0.72	1.55
France	0.58	1.17
Germany	0.33	2.02
Austria	0.64	1.15

The slower decrease in the American birth rate is probably due to the effects of heavy immigration during the early years of the present century.

To ascertain how much the annual number of births in the United States exceeds or falls short of the normal some standard of reference is needed. For this purpose the average birth rate among married women at each five-year age period of child bearing life in the three Scandinavian countries and Finland during the years 1871–94 have been accepted as the standard, and the number of births computed which would have occurred in the United States in 1900 and 1910 if the birth rate of American married women at each of the age groups had agreed with that of the corresponding group in the Scandinavian countries. Treating the results of such a computation as showing the normal number, the births in the United States in 1900 were 70 per cent. and in 1910 were 64 per cent. of the normal number. These percentages are higher than those of France, about the same as those of England, and lower than those of most other European countries.